

CLAIMS

1. Method for ammonia production through a catalytic reaction of pressurised synthesis gas in an appropriate compressor with a plurality of stages (1, 2), each of which  
5 is equipped with an inlet and outlet (1a, 2a, 1b, 2b, 2c) for said synthesis gas, which method includes a purification step through liquid ammonia of said synthesis gas from water and carbon dioxide contained in it, characterised in that said purification comprises the  
10 operating steps of:

- arranging a gas-liquid mixer (16) in fluid communication, on one side with the outlet (1b) of a first stage (1) of said compressor or with the outlet of an intermediate stage thereof and, on the other side, with the inlet (2b) of a  
15 stage (2) immediately following said first stage (1) or said intermediate stage, said mixer (16) having an axially extending portion of decreasing cross section,

- axially feeding into said mixer (16) a flow of synthesis gas outbound from said first stage (1) or from said  
20 intermediate stage at the same time as a flow of liquid ammonia, said flows being coaxial and in co-current,

- separating substantially anhydrous synthesis gas from the mixture of said flows outbound from said mixer (16) and sending said gas into said stage (2) following said first  
25 stage (1) or said intermediate stage.

2. Method according to claim 1, characterised in that said flow of synthesis gas is cooled to a temperature of between +8°/-20°C, before being fed into said mixer (16).

3. Method according to claim 2, characterised in that said cooling is carried out through a flow of liquid ammonia.

4. Method according to claim 3, characterised in that said cooling is carried out upstream of the inlet of said  
5 coaxial flows of synthesis gas and of liquid ammonia in said mixer (16).

5. Method according to claim 1, characterised in that said flow of liquid ammonia is fed into said mixer (16) in the form of a plurality of high speed jets.

10 6. Method according to claim 5, characterised in that said flow of liquid ammonia is fed into said mixer (16) making it pass through a nozzle (23) equipped with appropriate suitably sized openings or slits.

7. Apparatus for carrying out the method of claims 1 to 6,  
15 comprising a compressor with a plurality of stages (1, 2), each of which is equipped with an inlet and an outlet (1a, 2a, 1b, 2b, 2c), characterised in that it comprises a gas-liquid mixer (16) in fluid communication, on one side with the outlet (1b) of a first stage (1) of said compressor or  
20 with the outlet of an intermediate stage thereof and, on the other side, with the inlet (2b) of a stage (2) immediately following said first stage (1) or said intermediate stage, said mixer (16) having an axially extending portion (16a) of decreasing cross-section.

25 8. Apparatus according to claim 7, characterised in that a gas-liquid separator (8) is placed between said mixer (16) and said subsequent stage (2) of said compressor.

9. Apparatus according to claim 8, characterised in that at least one cooling group (19) is placed between said mixer (16) and said first stage (1) of said compressor.

10. Apparatus according to claim 7, characterised in that  
5 it comprises a nozzle (23) equipped with appropriate suitably sized openings or slits in fluid communication on one side with said portion (16a) of reduced cross-section of said mixer (16) and on the opposite side with a line (21a) for feeding a flow of liquid ammonia into said mixer  
10 (16).